Art in the Information Age: Technology and Conceptual Art

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ABSTRACT

Art historians have generally drawn sharp distinctions between conceptual art and art-and-technology. This essay reexamines the interrelationship of these tendencies as they developed in the 1960s, focusing on the art criticism of Jack Burnham and the artists included in the *Software* exhibition that he curated. The historicization of these practices as distinct artistic categories is examined. By interpreting conceptual art and art-and-technology as reflections and constituents of broad cultural transformations during the information age, the author concludes that the two tendencies share important similarities, and that this common ground offers useful insights into late–20th-century art.

In the mid-1960s, Marshall McLuhan prophesied that electronic media were creating an increasingly interconnected global village. Such pronouncements popularized the idea that the era of machine-age technology was drawing to a close, ushering in a new era of information technology. Sensing this shift, Pontus Hultén organized a simultaneously nostalgic and futuristic exhibition on art and mechanical technology at the Museum of Modern Art in New York (MOMA) in 1968. *The Machine: As Seen at the End of the Mechanical Age* included work ranging from Leonardo da Vinci's 16th-century drawings of flying machines to contemporary artist-engineer collaborations selected through a competition organized by Experiments in Art and Technology, Inc. (E.A.T.).

E.A.T. had emerged out of the enthusiasm generated by *nine evenings: theatre and engineering*, a festival of technologically enhanced performances that artist Robert Rauschenberg and engineer Billy Klüver organized in New York in October 1966. E.A.T. also lent its expertise to engineering a multimedia extravaganza designed for the Pepsi Pavilion at the Osaka World's Fair in 1970. Simultaneously, the American Pavilion at Osaka included an exhibition of collaborative projects between artists and industry that were produced under the aegis of the Art and Technology (A&T) Program at the Los Angeles County Museum of Art.

Ambitious as they were, few of the celebrated artist-engineer collaborations of this period focused on the artistic use of information technologies, such as computers and telecommunications. Taking an important step in that direction, *Cybernetic Serendipity,* at the Institute of Contemporary Art in London in 1968, was thematically centered on the relationship between computers and creativity. This show, however, remained focused on the materiality of technological apparatuses and their products, such as robotic devices and computer graphics.

Art critic Jack Burnham pushed the exploration of the relationship between art and information technology to an unprecedented point. In 1970, he curated the exhibition *Software, Information Technology: Its New Meaning for Art,* at the Jewish Museum in New York. This show was the first major U.S. art-and-technology exhibition that attempted to utilize computers in a museum context. *Software*'s technological ambitions were matched by Burnham's conceptually sophisticated vision, for the show drew parallels between the ephemeral programs and protocols of computer software and the increasingly "dematerialized" forms of experimental art, which the critic interpreted, metaphorically, as functioning like information processing systems. *Software* included works by conceptual artists such as Les Levine, Hans Haacke and Joseph Kosuth, whose art was presented beside displays of technology including the first public exhibition of hypertext (*Labyrinth,* an electronic exhibition catalog designed by Ned Woodman and Ted Nelson) and a model of intelligent architecture (*SEEK,* a reconfigurable environment for gerbils designed by Nicholas Negroponte and the Architecture Machine Group at the Massachusetts Institute of Technology) [1].

Regardless of these points of intersection and the fact that conceptual art emerged during a moment of intensive artistic experimentation with technology, few scholars have explored the relationship between technology and conceptual art. Indeed, art-historical literature traditionally has drawn rigid categorical distinctions between conceptual art and art-and-technology. The following reexamination, however, challenges the disciplinary boundaries that obscure significant parallels between these practices. The first part describes Burnham's curatorial premises for the *Software* exhibition and interprets works in the show by Levine, Haacke and Kosuth. The second part proposes several possible reasons why conceptual art and art-and-technology became fixed as distinct, if not antithetical, categories. The conclusion suggests that the correspondences shared by these two artistic tendencies offer grounds for rethinking the relationship between them as constituents of larger social transformations from the machine age of industrial society to the so-called information age of post-industrial society.

Before proceeding, some working definitions will clarify the terminology of conceptual art and art-and-technology in order to open up a discussion of their relatedness beyond the narrow confines of extant discourses. Resisting the arch formalism that had become institutionalized by the 1960s, conceptual art has sought to analyze the ideas underlying the creation and reception of art, rather than to elaborate another stylistic convention in the historical succession of modernist avant-garde movements. Investigations by conceptual artists into networks of signification and structures of knowledge (which enable art to have meaning) have frequently employed text as a strategic device to examine the interstice between visual and verbal

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languages as semiotic systems. In this regard, conceptual art is a meta-critical and self-reflexive art process. It is engaged in theorizing the possibilities of signification in art's multiple contexts (including its history and criticism, exhibitions and markets). In interrogating the relationship between ideas and art, conceptual art de-emphasizes the value traditionally accorded to the materiality of art objects. It focuses, rather, on examining the preconditions for how meaning emerges in art, seen as a semiotic system.

Art-and-technology has focused its inquiry on the materials and/or concepts of technology and science, which it recognizes artists have historically incorporated in their work. Its investigations include: (1) the aesthetic examination of the visual forms of science and technology, (2) the application of science and technology in order to create visual forms and (3) the use of scientific concepts and technological media both to question their prescribed applications and to create new aesthetic models. In this third case, art-and-technology, like conceptual art, is also a meta-critical process. It challenges the systems of knowledge (and the technologically mediated modes of knowing) that structure scientific methods and conventional aesthetic values. Further, it examines the social and aesthetic implications of technological media that define, package and distribute information.

Art as Software: Burnham, Levine, Haacke, Kosuth

The title for the *Software* exhibition was suggested to Burnham by artist Les Levine. Burnham himself had interacted directly with software as a fellow at the Center for Advanced Visual Studies (CAVS) at MIT during the 1968–1969 academic year. He reported on that experience in a public lecture organized by curator Edward Fry at the Guggenheim Museum in 1969, later published as "The Aesthetics of Intelligent Systems." Burnham expressed his interest in how "a dialogue *evolves* between the participants—the computer program and the human subject—so that both move beyond their original state" [2]. He further theorized this bi-directional exchange as a model for the "eventual two-way communication" that he anticipated emerging in art [3]. Karl Katz, director of the Jewish Museum, heard the talk and invited Burnham to curate an exhibition.

Following up the ideas he outlined in "The Aesthetics of Intelligent Systems" and in related essays, including "Systems Esthetics" (1968) and "Real Time Systems" (1969) [4], Burnham designed *Software* to function as a testing ground for public interaction with "information systems and their devices." Many of the displays were indeed interactive and based on two-way communication between the viewer and the exhibit. *Software* was predicated, moreover, on the ideas of "software" and "information technology" as metaphors for art. Burnham conceived of "software" as parallel to the aesthetic principles, concepts or programs that underlie the formal embodiment of actual art objects, which in turn parallel "hardware." In this regard, he interpreted contemporary experimental art practices, including conceptual art, as predominantly concerned with the software aspect of aesthetic production.

In his 1970 essay "Alice's Head," Burnham suggested that, like the "grin without the cat" in Lewis Carroll's *Alice in Wonderland,* conceptual art was all but devoid of the conventional materiality associated with art objects. He subsequently explained *Software* in similar terms, as "an attempt to produce aesthetic sensations without the intervening 'object'" [5]. Burnham theorized this artistic shift as paralleling larger social transformations based in cybernetics and systems theory. Here, the interactive feedback of information amongst systems and their components in global fields eradicated any "separation between the mind of the perceiver and the environment" [6].

In the late 1960s, Les Levine was at the forefront of artistic experimentation using the interactive feedback of information systems to interrogate the boundaries between viewer and environment. He was represented in *Software* by three pieces, including *Systems Burn-Off X Residual Software* (1969). The original installation at the Phyllis Kind Gallery in Chicago comprised 1,000 copies of 31 photographs taken by Levine at the March 1969 opening of the highly publicized *Earth Works* exhibition in Ithaca, New York. Numerous New York critics and journalists had been bused upstate for the event. Levine explained that most of the 31,000 photographs, which documented the media spectacle, were "randomly distributed on the floor and covered with jello; some were stuck to the wall with chewing gum; the rest were for sale" [7].

Levine's artist's statement in the *Software* exhibition catalog also outlined his concept of software and its relationship to art. He argued that the proliferation of mass media was changing knowledge into a second-hand mental experience of simulations and representations—i.e. software—as opposed to first-hand, direct, corporeal experiences of actual objects, places and events, i.e. hardware.

> All activities which have no connection with object or material mass are the result of software. Images themselves are hardware. Information about these images is software. . . . The experience of seeing something first hand is no longer of value in a software controlled society, as anything seen through the media carries just as much energy as first hand experience. . . . In the same way, most of the art that is produced today ends up as information about art [8].

Levine conceived of the 31,000 individual photos as the residual effects or "burn-off" of the information system he created—as the material manifestation of software. In other words, *Systems Burn-Off* was an artwork that produced information (software) about the information produced and disseminated by the media (software) about art (hardware). It offered a critique of the systematic process through which *art objects* (hardware) become transformed by the media into *information about art objects* (software). Whereas Levine stated that most art "ends up as information about art," *Systems Burn-Off* was *art as information about information about art,* adding a level of complexity and reflexivity onto that cycle of transformations in media culture.

Systems Burn-Off can be related to Levine's interactive video installations, such as *Iris* (1968) and *Contact: A Cybernetic Sculpture* (1969). In these works, video cameras captured various images of the viewer(s), which were fed back, often with time delays or other distortions, onto a bank of monitors. As Levine noted, "'Iris' . . . turns the viewer into information . . . 'Contact' is a system that synthesizes man with his technology . . . the people are the software" [9]. Although these works demanded the direct, corporeal experience of the participant, it was the experience of seeing oneself as information—as transformed into software—that was of primary concern to the artist. In this regard, Levine provocatively has noted that, "Simulation is more real than reality. Reality is an over-rated hierarchy" [10]. For many artists working at the intersection of conceptual art and art-and-technology, the particular visual manifestation of the artwork as an object was secondary to *the expression of an idea that becomes reality by simulating it.*

Conceptual artist Hans Haacke also utilized technology and mass media in the production of art. Perhaps best known for his politically charged cri-

tiques of art institutions and industry, his work in the early 1960s evolved from kinetic sculpture and was included in a number of key Nouvelle Tendence exhibitions. These early works were predicated on the dynamism of natural systems, an idea that was integral to diverse strains of process and conceptual art, as well as to art-and-technology. Haacke considered himself a "sort of junior partner" of the German-based Zero group [11], renowned for their sky and light works of the late 1950s. The Howard Wise Gallery, the premier commercial venue for the presentation of art-and-technology, gave Haacke solo exhibitions in 1966, 1968 and 1969.

A close friend of Burnham since 1962, Haacke contributed two pieces to the *Software* exhibition: *News* and *Visitor's Profile*. These works were part of the artist's *Real Time Systems* series, inspired in part by conversations with Burnham, who introduced Haacke to the idea of open biological systems developed by Ludwig Von Bertalanffy and to Norbert Wiener's theories of cybernetics. Burnham's article "Real Time Systems" differentiated between "ideal time" and "real time" with respect to art, a distinction that Haacke applied to his work. In ideal time, the aesthetic contemplation of beauty occurs in theoretical isolation from the temporal contingencies of value; while in real time, value accrues on the basis of an immediate, interactive, and necessarily contingent exchange of information.

News (1969) incorporated several Teletype machines that delivered a perpetual flow of information about local, national and international events, printed out on continuous rolls of paper in real time. The computerized *Visitor's Profile* planned for Software was more technologically sophisticated than the manual version installed at the *Information* exhibition the same year. The computer was programmed to instantaneously cross-tabulate demographic information about the museum audience (age, sex, education and so on) with their opinions on a variety of provocative subjects, ranging from "Should the use of marijuana be legalized, lightly or severely punished?" to "Assuming you were Indochinese, would you sympathize with the present Saigon regime?" [12] Whereas the statistical data from the other versions of *Visitor's Profile* were tabulated on a daily basis, the *Software* version was designed to perform these calculations in real time. As Haacke noted in his artist's statement:

> The processing speed of the computer makes it possible that at any given time the statistical evaluation of all answers is up to date and available. The constantly changing data is projected onto a large screen, so that it is accessible to a great number of people. Based on their own information a statistical profile of the exhibition's visitors emerges [13].

Like Levine, Haacke did not use technology as an end in itself, but rather put it in the service of the ideas that were central to his artistic practice. As in earlier technologically enhanced works by Haacke, such as *Photo-Electric Viewer-Programmed Coordinate System* (1966–1968), technology was employed as a means to enable art to become a responsive, real-time system that "merges with the environment in a relationship that is better understood as a 'system' of interdependent processes" [14]. Similarly, in the *Software* version of *Visitor's Profile,* a computer received, processed and distributed information instantaneously so that the piece could interact with participants in real time by responsively gathering and evaluating information about the systematic relationship between art and society. In this regard, Haacke's work shares common concerns with the conceptual goals underlying the work of many artists associated with art-and-technology, including Nicolas Schöffer's *CYSP* series of cybernetic sculptures of the mid-1950s, James Seawright's interactive robotic sculptures beginning in the mid-1960s, Sonia Sheridan's founding of the Generative Systems program at the School of the Art Institute of Chicago in 1970, Myron Kreuger's "artificial reality" environments beginning in the early 1970s and the veritable explosion of art combining computers and telecommunications since 1980.

Like Levine and Haacke, Joseph Kosuth also has utilized mass media as a component in his work. However, unlike those artists, Kosuth has not made explicit use of technology such as video, computers or telecommunications. Nonetheless, the technological metaphor of information processing offers an insightful model for interpreting his work. His contribution to *Software,* the *Seventh Investigation (Art as Idea as Idea) Proposition One* (1970), included the same printed text in various international contexts: a billboard in English and Chinese in the Chinatown neighborhood of lower Manhattan, an advertisement in *The Daily World* and a banner in Turin. The text comprised a set of six propositions:

(1) to assume a mental set voluntarily

(2) to shift voluntarily from one aspect of the situation to another

(3) to keep in mind simultaneously various aspects

(4) to grasp the essential of a given whole; to break up a given whole into parts and to isolate them voluntarily

(5) to generalize; to abstract common properties; to plan ahead ideationally; to assume an attitude toward the "mere possible" and to think or perform symbolically

(6) to detach our ego from the outer world

Kosuth's statement in the *Software* catalog emphasized his intention that the work not be reducible to a mental image, but that it exist as information free of any iconography: "The art consists of my action of placing this activity (investigation) in an art context (i.e. art as idea as *idea*)" [15].

According to the software metaphor underlying Burnham's exhibition, the art in Kosuth's work was not the billboard or the other structural elements (hardware), but was manifested rather in the idea of contextualizing philosophical questions (software) within the context of visual art and simultaneously decontextualizing them in various public, non-art media. In this way, his work investigated the relationship between art and non-art ideas, the vehicles by which they are expressed, and the semiotic networks that enable and delimit their meanings in multiple contexts.

Applying the parallel Burnham drew—between how computer software controls the hardware that runs it and how information directs the activity of the human mind—to Kosuth's work, one can interpret the artist's propositions as operating like instructions in the mind of the viewer. But whereas computer software has an instrumental relationship with hardware, coordinating its operation, the artist's propositions function as meta-analyses of the phenomenological and linguistic components of meaning. In other words, they demand that the viewer examine the process of processing information, *while in the process of doing so.*

Although Kosuth did not explicitly draw on computer models of information processing, his investigations follow similar modes of logic, while at the same time demanding a self-reflexivity that exceeds computational systems. By posing propositions that required viewers to investigate the cognitive functioning of their own minds with respect to the processing of information and the creation of meaning, Kosuth's *Seventh Investigation* sought to interrogate how and why what he called the "language game" of art functioned in a larger cultural framework. This critical project reflects the shift from an industrial to a post-

industrial economic base, characteristic of the information age. Here meaning and value are not embedded in objects, institutions, or individuals so much as they are abstracted in the production, manipulation and distribution of signs and information.

Resistance to Parallels between Conceptual Art and Art-and-Technology

In *Art into Ideas,* Robert C. Morgan credited Burnham's "Systems Esthetics" with having clarified the "feeling that art had traversed from the object to the idea, from a material definition of art to that of a system of thought." Morgan then described conceptual art as "a significant and innovative method or type (not a style) of artistic practice on the eve of the Informational Age" and noted a "parallel socioeconomic phenomenon . . . the penumbra between industry and postindustry" [16].

Burnham had already drawn a similar parallel in "Systems Esthetics," which referred to the shift in industry from the control of production to the control of information that John Kenneth Galbraith described in *The New Industrial State.* However, in "Systems Esthetics" he also drew explicit parallels between conceptual art and developments in systems theory and computer information processing. For Burnham, these scientific and technological advances were inseparable from the sweeping economic and social changes that Galbraith and others were identifying and forecasting.

Morgan's alliance with Burnham ceases precisely at the point of drawing an explicit parallel between conceptual art and information technology. No art historian since Burnham has made that connection so emphatically; and nearly all have sought to dismiss it. However, it is unclear how the relationship that Morgan recognizes between conceptual art, the information age and post-industrial society can be explained without recourse to the specific technologies that emerged with them. If those relationships are going to be drawn (and I argue for doing so), then it will be necessary to address, as Burnham did, the scientific and technological advances that contributed to broader cultural and social changes.

Nonetheless, it is understandable why conceptual art and art-and-technology have been identified as distinct categories of artistic practice. Art-and-technology, which had offered a useful path of aesthetic experimentation throughout the 1950s and 1960s, no longer appeared to be a viable direction for many artists in the 1970s. Critics opined that it was dominated by the materiality and spectacle of mechanical apparatus, which was anathema to the conceptual project. Technical failures of art and technology exhibitions, like *Software* (which, ironically, was plagued with software problems), contributed to waning public interest, just at the moment that a succession of large, successful exhibitions of conceptual art were mounted. Widespread skepticism towards the military-industrial complex after May 1968 and amidst the Vietnam War, the Cold War and mounting ecological concerns all contributed to problematizing the artistic use of technology—and the production of aesthetic objects in general—within the context of commodity capitalism [17]. Conceptual art, on the other hand, with its assault on the modernist object, became increasingly influential to a variety of *au courant* artistic discourses, including photography, performance and installation. It stands to reason that artists, critics, dealers, curators and collectors invested in internationally prestigious conceptual art would want to distance themselves from associations with art-and-technology, which appeared increasingly peripheral to contemporary artistic concerns, if not simply *passé.*

These factors all contributed to exacerbating distinctions between the artistic tendencies, rather than revealing the fluidity and continuity between them. It would be a mistake, however, to underestimate the commonalities between conceptual artists and artists like Schöffer, Seawright, Sheridan, Krueger and numerous others, who, like other mid- and late–20th-century artists associated with art-and-technology, were concerned with process, real-time interaction and dynamic systems. Moreover, artists who applied a conceptual approach to exploring technological ideas did not easily fit either category. The example of Roy Ascott powerfully demonstrates the significant intersections between conceptual art and art-and-technology, exploding the conventional autonomy of these art-historical categories.

Ascott, the British artist most closely associated with cybernetic art in England, was not included in *Cybernetic Serendipity* because his use of cybernetics was primarily conceptual and did not explicitly utilize technology [18]. Conversely, although his essay on the application of cybernetics to art and art pedagogy, "The Construction of Change" (1964), was quoted on the dedication page (to Sol Lewitt) of Lucy Lippard's seminal *Six Years: The Dematerialization of the Art Object from 1966 to 1972* [19], Ascott's anticipation of and contribution to the formation of conceptual art in Britain has received scant recognition, perhaps (and ironically) because his work was too closely allied with art-and-technology. In this regard, Ascott's use of the thesaurus in 1963 drew an explicit parallel between the taxonomic qualities of verbal and visual languages, a concept that would be taken up in Joseph Kosuth's *Second Investigation, Proposition 1* (1968) and Mel Ramsden's *Elements of an Incomplete Map* (1968).

Sol Lewitt's influential essay "Paragraphs of Conceptual Art" (1967) further exemplifies the complications and conflicts at the intersection of conceptual art and art-and-technology. In the second paragraph he described conceptual art as a quasi-mechanical process: "In conceptual art the idea of concept is the most important aspect of the work . . . [t]he idea becomes a machine that makes the art." Several paragraphs later, however, he warned that "new materials are one of the great afflictions of contemporary art. . . . The danger is, I think, in making the physicality of the materials so important that it becomes the idea of the work (another kind of expressionism)" [20]. Although the idea of unifying art and technology held substantial cultural currency for much of the 20th century, many artists, critics and historians came to perceive the junction as weighted down by (in Lewitt's words) the "physicality of the materials," which dominated the "idea of the work." In her introduction to *Conceptual Art,* Ursula Meyer appropriated a technological metaphor and wrote, "Conceptual Art is diametrically opposed to hardware art" [21].

This sentiment was held perhaps more strongly in conceptual art circles, where the battle against the formalism of modernist objects (and their complicity as commodities in reinforcing capitalist ideology) was being waged most fervently. From this anti-formalist perspective, the bells and whistles of art-and-technology appeared to be gaudy, expressionistic and commercial excesses that were extraneous and antithetical to the aesthetic investigation of superstructural ideas and questions of semiosis that defined key agendas of conceptual art.

The writing of art historian and critic Charles Harrison, a member of Art & Language (A&L) since 1969, demands close and careful analysis in this regard because of its centrality to the discourses of conceptual art. Harrison has written, "The rapprochement of art and tech-

nology . . . tended to suffer from a trivial equation of 'modernity' with scientific and mechanical development. It tended also to be co-opted by the very representational technologies it set out to exploit" [22]. He also stated that during this "time of E.A.T. . . . and of *Cybernetic Serendipity* . . . it seemed to some as if fascination with design and technology might be significantly injected into artistic modernism. The boot was on the other foot, however" [23]. Paraphrasing A&L co-founder Michael Baldwin, Harrison wrote that the "legacies of Pop-Art-and-technology were never part of the Art & Language agenda," [24] and further claimed that they never "furnished much better than chronic distractions from the more interesting and intractable problems of modern art" [25].

Although Pop art and art-and-technology intersected at certain points, they also represent two very different legacies. By collapsing them together, Baldwin and Harrison reduce the unique qualities and goals of each to their least common denominator, namely the use of technology as a formal element wielded in the interest of appealing to the masses. Indeed, Baldwin had in mind the "art-democratised-as-light-shows-or-cyberneticised-life-style machine" events of the UK group Fine Artz, with whom A&L co-founder David Bainbridge was affiliated [26]. Burnham also denigrated the "chic superficiality that surrounded . . . many of the kinetic performances and 'light events,'" which he equated with the sensation of "the uptown discotheque" [27]. However, Burnham, being much more interested in and knowledgeable about art-and-technology, also recognized that its more theoretically sophisticated aspects—i.e. its concern with process and systems, the relationship between technological and aesthetic structures of knowledge, and an interactive, two-way exchange of information—were closely related to central features of conceptual art.

Despite his indifference to art-and-technology, Harrison acknowledged the interest in technology shared by A&L founding members Harold Hurrell and David Bainbridge. He described the former's *Cybernetic Artwork that Nobody Broke* (1969) [28] and the latter's *Lecher System* (1969–1970) [29] as "flailing about—products of the search for practical and intellectual tools which had not already been compromised and rendered euphemistic in Modernist use" [30]. But there is much more to these works than that. I suggest that they, as well as Terry Atkinson and Baldwin's *22 Sentences: The French Army* (1967) [31], exemplify critical concerns at the heart of art-and-technology.

Hurrell's spurious computer program for interactively generating color refused to allow the user to interact beyond the rigid banality of binary input. If the user input a number other than 0 or 1, the program proffered the message: "YOU HAVE NOTHING, OBEY INSTRUCTIONS!" If the user input a non-number, *Cybernetic Art Work* told him or her that there was an "ERROR AT STEP 3.2." *Lecher System* juxtaposed a "'sculptural morphology' and an 'electromagnetic morphology.'" The perceptual experience of interacting with the sculptural aspect of the system was intended to result in knowledge about the electromagnetic aspect of the system that, in turn, would create knowledge about the sculptural aspects. *22 Sentences* included a key to abbreviations for the French Army (FA), the Collection of Men and Machines (CMM), and the Group of Regiments (GR), then described the inter-relationships between them:

> The FA is regarded as the same CMM as the GR and the GR is the same CMM as (e.g.) "a new order" FA (e.g. Morphologically a member of another class of objects): by transitivity the FA is the same CMM as the "New Shape/Order one."

This ironic passage reduced to absurdity the sort of systematic relationships between individuals, groups, and institutions characteristic of cybernetics (it is surprisingly similar to the anagrammatic rhetoric of Ascott's "cybernetic art matrix" [32]). Although not explicitly stated in the work, the artistic *avant-garde* is also morphologically connected to the French military, from which the term comes. So the relations articulated in the work must also be mapped onto art relations. It is worth noting, moreover, that the French Army is "decimated," in eight of the 22 sentences, hardly a coincidence, given the war then being waged in the former French colony of Viet Nam.

Because these works by A&L members were infused with irony, their technological or pseudo-technological components must be interpreted as parodies of scientific structures of knowledge and their uncritical application in art and society in general. In challenging the systems of knowledge (and the technologically mediated modes of knowing) that structure scientific methods and conventional aesthetic values, these works have much in common with the objectives of art-and-technology. Indeed, the critical questioning of the implications of technology characterizes a wide variety of artistic inquiries in the domain of art-and-technology since the 1950s. Key monuments include Gustav Metzger's theory of auto-destructive art (1959), Tinguely's *Homage to New York* (1960), Nam June Paik and Shuya Abe's *Robot K-456* (1964) and Øyvind Fahlstrom's *Kisses Sweeter than Wine* (1966). The work of Stelarc, Lynn Hershman, Survival Research Laboratories, Julia Scher, Jodi.org and others continue this tradition of art-and-technology in a manner that challenges modernist aesthetics and technocracy.

Equating art-and-technology with machine aesthetics, kinetic gadgets, and other spectacles that feed on and sustain modernist discourses rather than interrogate them, Harrison and other critics of conceptual art were unaware of, unimpressed by, or disinterested in this critical aspect of artists' use of technology. Yet, Harrison's early-1980s description of Art & Language's *Index 01* (1972) [33] explicitly referred to the fields of artificial intelligence and what has come to be known as neurophilosophy, with strong overtones of cybernetics and systems theory. In this regard, his discussion of the systematic approaches of conceptual art is remarkably similar to Burnham's theories on the systematic relationship between technology and conceptual art as exemplified in *Software* [34]. A&L's *Index,* moreover, can be thought of as a kind of manual hypertext system that allows for the interactive associative linking of ideas. As mentioned above, the first public exhibition of hypertext took place in Burnham's exhibition. In these ways, both the practice and criticism of conceptual art and art-and-technology are much more closely related than the historicization of these artistic tendencies as distinct categories would lead one to believe.

Harrison's accounts of Art & Language tend to focus on identifying the philosophical and political foundations of the group's challenges to the aesthetic discourses of modernism. But by limiting its foil to pre-war notions of materiality and production and formalist aesthetic issues, his history of A&L (like the art criticism of conceptual art in general) is unnecessarily narrow in its implications because it fails to address the relationship of late–20th-century experimental art to the information age of post-industrial society. In addition to the relevant philosophical, political and aesthetic issues, a more comprehensive account of post–World War II art must also take into consideration the specific scientific and

technological theories and developments that contributed to larger social formations that impacted all aspects of material culture.

Conclusion

The continuities between art-and-technology and conceptual art are more readily apparent from a historical distance of three decades, removed from the aesthetico-political debates of that time. Advances in electronics, computing and telecommunications—and especially the advent of the Internet—have provided tools that enable artists to interrogate the conventional materiality and semiotic complexity of art objects in ways that were not available 30 years ago. Such developments also bring into relief the failure of critical discourses to reconcile how the work of an artist could be allied simultaneously with both art-and-technology and conceptual art. Haacke, for example, exhibited at the Howard Wise Gallery, and his work features prominently in key monographs on kinetic art and art-and-technology. Nonetheless, his work has been canonized primarily within the context of Conceptual Art. Other artists, such as Ascott, remained simultaneously visible and invisible to each camp throughout the 1960s and 1970s, because of his close affinities to both. The critical reception and historicization of Haacke and Ascott says less about their work than it does about the institutional mechanisms that have created and reinforced categorical distinctions between art-and-technology and conceptual art at the expense of identifying continuities between them.

By respecting the differences between these artistic tendencies, while at the same time understanding some of the common theoretical threads that they have shared, a more comprehensive account of art since the mid-20th century can be formulated. Such a history will acknowledge cybernetics, information theory and systems theory as foundational intellectual models that, in combination with the advent of digital computing and telecommunications, played a significant role in shaping culture. As Burnham wrote in 1970,

> Information processing technology influences our notions about creativity, perception and the limits of art. . . . It . . . is probably not the province of computers and other telecommunication devices to produce works of art as we know it; but they will, in fact, be instrumental in redefining the entire area of esthetic awareness [35].

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Dedicated to Judy Fishman, for nurturing my love of art.

References and Notes

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4. Jack Burnham, "Systems Esthetics," *Artforum* **7**, No. 1, 30–35 (September 1968); Jack Burnham, "Real Time Systems" *Artforum* **8**, No 1, 49–55 (September 1969).

5. Jack Burnham, correspondence with the author, 23 April 1998.

6. Jack Burnham, "Alice's Head," *Artforum* **8**, No. 6 (February 1970), reprinted in Jack Burnham, *Great Western Salt Works* (New York: George Braziller, 1974) p. 47.

7. Burnham [1] p. 60.

8. Les Levine, artist's statement, in Burnham [1] p. 61.

9. Levine quoted in Gene Youngblood, *Expanded Cinema* (New York: Dutton, 1970) p. 340.

10. Les Levine, telephone interview with the author, 21 January 1999. Curiously, this recent statement employs rhetoric that belies Levine's anticipation of Baudrillard's theory of simulacra.

11. Hans Haacke, interview with the author, 2 January 1999.

12. Haacke [11] explained that the *Software* questionnaire was almost identical to the version he proposed for his solo exhibition at the Guggenheim Museum in 1971, which the museum canceled. See also Brian Wallis, ed., *Hans Haacke: Unfinished Business* (Cambridge, MA: MIT Press, 1986) pp. 82–87.

13. Hans Haacke, artist's statement in Burnham [1] p. 34.

14. Hans Haacke, artist's statement in *Hans Haacke,* exh. cat. (New York: Howard Wise Gallery, 1968); quoted in Burnham "Systems Esthetics" [4] p. 35.

15. Joseph Kosuth, artist's statement, in Burnham [1] p. 68.

16. Robert C. Morgan, *Art into Ideas* (New York: Cambridge Univ. Press, 1996) pp. 2–3.

17. Edward A. Shanken, "Gemini Rising, Moon in Apollo: Attitudes Towards Art and Technology in the US, 1966–1971," in *ISEA97* (Proceedings of International Society for Electronic Art) (Chicago: ISEA97, 1998); reprinted on-line in *Leonardo Electronic Almanac* **6**, No. 12 (January 1999), <http://mitpress.mit.edu/e journals/LEA/ARTICLES/gemini.html>.

18. Jasia Reichardt, interview with the author, 30 July 1998, London.

19. Lucy R. Lippard ed., *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (New York: Praeger, 1973).

20. Sol Lewitt, "Paragraphs on Conceptual Art," in Stiles and Selz, *Theories and Documents of Contemporary Art* (Berkeley: University of California Press, 1996) p. 825.

21. Ursula Meyer, *Conceptual Art* (New York: Dutton, 1972) p. xvi.

22. Charles Harrison, *Essays on Art & Language* (London: Basil Blackwell, 1991; Cambridge, Mass: MIT Press, 2001) p. 17.

23. Harrison [22] p. 260, n. 25.

24. Harrison [22] p. 261, n. 30.

25. Charles Harrison, "The Late Sixties in London and Elsewhere," in Hillary Gresty, ed., *1965–1972—When Attitudes Became Form,* (Cambridge, U.K.: Kettle's Yard Gallery, 1984) pp. 10–11.

26. Michael Baldwin, e-mail correspondence with the author, 9 April 2002.

27. Jack Burnham, "Steps in the Formulation of Real-Time Political Art," in Kaspar Koenig, ed., *Hans Haacke: Framing and Being Framed, 7 Works 1970–1975* (Halifax, Canada: The Press of the Nova Scotia College of Art and Design, 1975) pp. 128–129.

28. Illustrated in Harrison [22] p. 58.

29. Terry Atkinson, David Bainbridge, Michael Baldwin, and Harold Hurrell, "Lecher System," *Studio International* **180**, No. 924 (July–August 1970); reprinted in Meyer [21] pp. 22–25.

30. Harrison [22] p. 56.

31. Detail illustrated in Harrison [22] p. 52. Full text on the CD-ROM in *Art & Language, Too Dark to Read: Motifs Rétrospectifs 2002–1965* (Lille, France: Musée d'art moderne Lille Métropole, Villeneuve d'Ascq., 2002).

32. Roy Ascott, "Behaviourist Art and the Cybernetic Vision," *Cybernetica* **10** (1967) pp. 25–56.

33. Harrison [22] p. 72.

34. Compare, for example, Harrison [22] pp. 72–73 with Burnham [3] p. 12.

35. Burnham [3] p. 11.

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